REMARKS

Summary of Office Action

Claims 1-7 are pending.

Claims 1-7 have been rejected under 35 U.S.C. 102(b) as being anticipated by Adamian U.S. Patent No. 5,578,932 ("Adamian").

Applicant's Reply

Applicant has amended the claims, and respectfully traverses the prior art rejection as described in the previous Reply dated April 17, 2006.

Applicants request consideration of the following additional Remarks.

First, Adamian does not teach a method for calibrating a VNA having multiple ports. Adamian describes a test set referred to as "MSETS" that may be connected to a conventional two-port VNA, to permit also calibration for multi-port measurements.

For use of the two-port VNA for multiport calibrations, Adamian's test set has two output ports (reference numerals 170 and 172 in Fig. 12), which, for calibration, are coupled to both ports of the two-port VNA (see Fig. 5 and col. 5, lines 50-61). The test set includes all standards (THRU or LINE, SHORT and OP as reflection standard, MATCH as wave termination) that are necessary for calibration. These individual standards are subsequently switched in by two switches (134 and 136 in Fig. 12). An additional impedance standard (here a 3dB attenuator) may be switched in by two additional switches (154 and 156 in Fig. 12), to get additional information about the system and to enhance the accuracy of error correction. This has well been appreciated by the Examiner. However, this additional information does not result

in a modification of the error correction model, it results in an over-determination of the system and hence in a more exact correction. Adamian uses the twelve-term error correction model for modeling the systematic errors in the VNA. (See Fig. 8 and the corresponding description at col. 10, line 45 through col. 11, line 2). The twelve terms are the twelve error coefficients: ELM, ETV, ERV, ESV, EDV and additionally EXV in forward direction of measurement, and ELR, ETR, ERR, ESR, EDR and additionally EXR in reverse direction of the measurement. Applicant notes that it is controversial in the art whether EXR and EXF should be considered as additional terms. Therefore, the twelve-term model also is referred to as ten-term model in the art. Hence, in the following discussion applicant will also refer to the ten-term model.

In the description of Adamian, it is important to distinguish the unknown error coefficients of the measuring sys tem (col. 11, lines 3-9) and the known physical standards (col. 10 lines 55-58). The calibration measurement aims at the error coefficients of the measuring system. Once the latter are known, the systematic error of the system for a measurement of a device under test (PUT) may be eliminated by calculation to determine the actual physical behavior of the DUT.

Adamian determines the error coefficients by measurement of known transfer standards (col. 10, lines 55-58), by transferring the measurement data thereof into a scattering matrix, as has been appreciated by the Examiner. All standards necessary therefore, i.e. impedances, low-loss through-connections and high isolation connections (col. 10, lines 64-66), are known from preceding measurements (col. 10, lines 61—64).

The relationship between the measurement of known standards and the unknown error coefficients that are to be calculated from it is as follows:

a) from the two measurements (FORWARD and REVERSE) of the standard THRU, that directly couples two ports, 4 terms, i.e. error coefficients, may be determined;

b) from the two measurements of the standard OP at both of the ports of the VNA, 2 terms may be determined;

c) from the measurements of SHORT, also 2 terms may be determined; and

d) from the measurements of MATCH, likewise 2 terms may be determined;

so that in all 10 terms may be derived.

However, if the two standards OPEN and SHORT are unknown (as in the case of applicant's claim 1, features c and d and claim 2, features a and d) only one term may be determined from a respective measurement. Thus, the relationship between the measurement of known standards and unknown standards according to the present patent application is as follows:

e) from the measurements of the known THRU standard (claims 1 and 2, features a), 4 terms may be determined;

f) from the measurements of the known MATCH standard (claims 1 and 2, features b), 2 terms may be deter mined; and

g) from the measurements of the unknown OPEN standard, one term may be determined.

Thus, 7 terms are known, so that the unknown OPEN standard may be determined by the seven-term method. In the same way, the unknown SHORT standard also may be determined in a further measurement according to the present patent application, such that both of initially unknown standards now are known. Both unknown standards therefore are to be considered as self calibrating. By means of the measurements mentioned above under a) - d) and

by calculations as well as by means of the ten-term model the 10 error coefficients then may be calculated.

Applicant submits that this comparison of the two calibrating methods clarifies that the features c and d of claims 1 and 2 are not disclosed by Adamian, and that the citations set forth by the Examiner do not relate to the 'n unknown greatly reflective terminations," but as explicitly mentioned in column 11, lines 3-9 to the "unknown error model coefficients".

Furthermore, the subject matter claimed in the patent application is different from that disclosed in the Adamian in that in the present patent application 2n measurement locations have to be used, e.g. twice the number of measurement ports that the measuring object is provided with. Adamian does not mention the number of measurement locations in describing the test set as mentioned above, the number of measurement locations, however, being implemented in the conventional two-port VNA. However, it is known from DE 199 18 697 Al that two-port VNAs employ n+1 measurement ports. One measurement location is located at the common measurement channel for both ports before the switch and further measurement locations are arranged at the measurement channel of each port (see specification page 3, lines 1—5; DE 1991 697 Al, Figs. 2 and 3). The result is that the switch i involved in the measuring system and thus also is taken into account in the error coefficients.

Contrary thereto, two of the 2n measurement locations of the claimed multiport VNA are provided each on a respective of the n measurement channels of each port (Fig. 2). The advantage thereof is that the switch does not form a part of the measuring system.

Finally, applicant notes that the switches in the Adamian and the switches in the present application have different functions. While the Adamian switch switches in the

individual standards, the switch of the patent application couples the signal source to the individual ports.

Conclusion

Applicant respectfully submits that this application is now in condition for allowance. Reconsideration and prompt allowance of which are requested.

If there are any remaining issues to be resolved, applicants respectfully request that the Examiner should kindly contact the undersigned attorney for a telephone interview.

Respectfully submitted,

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